IN THE CLAIMS

Please cancel, without prejudice, Claim 1

Please insert claims as follows:

29. A solid membrane comprising a mixed metal oxide material of a perovskite structure containing a lanthanide in combination with Co, Sr or an oxide thereof, provided that the solid membrane contains less than 13 mol percent bismuth, cerium, or mixture of bismuth and cerium.

30. The solid membrane of claim 29 wherein the lanthanide is lanthanum.

31. A solid multi-component membrane comprising an intimate, gas-impervious, mixture of a first mixed metal oxide material of a perovskite structure with a second mixed metal oxide material of a perovskite structure, wherein the first mixed metal oxide material has an electron conductivity greater than that of the second mixed metal oxide material and the second mixed metal oxide-material has an oxygen ion conductivity greater than that of the first mixed metal oxide material.

32. An electrochemical process for producing products which are liquid at ambient conditions from methane, natural gas or other light hydrocarbons which comprises

(A) providing an electrochemical cell which comprises first and second zones separated by a solid gas-impervious membrane comprising a mixed metal oxide material of a perovskite structure having electron conductivity and oxygen ion conductivity,

(B) heating the electrochemical cell to a temperature of from about 1000°C to about 1400°C,

(C) passing an oxygen-containing gas in contact with the membrane in the first zone, and

(D) passing methane or natural gas in contact with the membrane in the second-zone,

(E) recovering a substantially nitrogen-free synthesis gas comprising a mixture of hydrogen and carbon monoxide, from the second zone, and

(F) converting the recovered synthesis gas to products which are liquid at ambient conditions.

33. The process of claim 32 wherein (D) comprises passing a methane-steam mixture in contact with the membrane in the second zone.

34. The process of claim 32 wherein the membrane comprises an electron-conductive mixed metal oxide of a perovskite structure which exhibits electron-conductivity and oxygen ion-conductivity.

35. The process of claim 32 wherein air is passed in contact with the membrane in the first zone.

36. An electrochemical process for producing hydrogen cyanide from methane and ammonia which comprises:

(A) providing an electrochemical cell comprising first and second zones separated by a solid multi-component membrane comprising an intimate, gas-impervious, multi-phase mixture of an electronically-conductive phase and an oxygen ion-conductive phase,

(B) heating the electrochemical cell to a temperature of from about 1000°C to about 1400°C,.

(C) passing an oxygen-containing gas in contact with the membrane in the first zone, and

(D) passing methane and ammonia in contact with the membrane in the second zone.

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37. The electrochemical process of claim 36 which further comprises

(E) recovering hydrogen cyanide from the second zone.

38. The electrochemical process of claim 36 wherein the electronically-conductive phase comprises nickel, cobalt, copper, silver, gold, platinum, palladium, rhodium, ruthenium, bismuth oxides, tin-indium oxide mixtures, praseodymium-indium oxide mixtures, cerium-lanthanum oxide mixtures, niobium-titanium oxide mixtures, or electron-conductive mixed metal oxides of a perovskite structure, or mixtures thereof.

39. The electrochemical process of claim 36 wherein the electronically-conductive phase comprises platinum or palladium metal.

40. The electrochemical process of claim 36 wherein the electronically-conductive phase comprises a praseodymium-doped indium oxide.

41. An electrochemical process for producing hydrogen cyanide from methane and ammonia which comprises

(A) providing an electrochemical cell which comprises first and second zones separated by a solid multi-component membrane comprising gas-impervious mixed oxide material of a perovskite structure having electron conductivity and oxygen ion conductivity,

(B) heating the electrochemical cell to a temperature of from about 1000°C to about 1400°C,

(C) passing air or oxygen in contact with the membrane in the first zone, and

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(D) passing methane and ammonia in contact with the membrane in the second zone.

42. The process of claim 41 further comprising

(E) recovering hydrogen cyanide from the second zone.

43. The process of claim 41 wherein the mixed metal oxide material of a perovskite structure comprises a combination of elements selected from the group consisting of lanthanides, alkaline earth metals, Y, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Zr, and Nb, oxides thereof, and mixtures of these metals and metal oxides.

44. The process of claim 41 wherein air is passed in contact with the membrane in the first zone.

REMARKS

Claims 29 to 44 have been provided for examination.

Instant Claims 29 to 31, 33 and 35 to 42 correspond "word-for-word" with Claims 13 to 15, 67, 73 and 100 to 108 respectively, and Claims 32 and 34 are derived from Claim 66, 71 and 72 of commonly assigned application Serial Number 07/510,296 filed on April 16, 1990 which was fully incorporated by reference in the Cross-Reference to Related Applications, on page 1 of instant specification as in all intervening applications of the family. Support for Claim 32 is also found in the specification, for example at page 37, line 19 to page 38, line 30.